STAT

Sanitized Copy Approved for Release 2011/07/14 : CIA-RDP80-00809A000700230071-6

STAT

CLASSIFICATION OF SOVIET SHIPYARDS; NEW VESSELS AND ENGINE INSTALLATIONS

[Summary: This report presents information from Soviet publications on the following subjects: classification of Soviet shipyards, characteristics of the RBT-300 icebreaker-tug, introduction of wheelhouse engine controls on fishing vessels, and development of a new gas generator.

Four figures are appended.]

CLASSIFICATION OF SOVIET SHIPYARDS

Organizatsiya Proizvodstva Stapel'nogo Tsekha pri Potochno-Pozitsionnom Metode Postroiki Sudov
Moscow, Sudpromgiz, 1952

V. P. Mamontov

At present, the term "sudostroitel'nyy zavod" is used to designate a shipbuilding enterprise which has within its complex complete shipyard works, i.e., facilities for producing steel hulls, parts, assemblies, and sections of hulls (with the industrial program of the enterprise assuring that these facilities are used for shipbuilding), as well as special ship-rigging and finishing shops commensurate with the production of the building slips, docks, and shoreside facilities. Secondly, it has a more or less complete machinery-building plant -- foundry, forging, machine, and assembly shops.

In addition, a "sudostroitel'nyy zavod" usually has a sawmill, a woodworking shop, wood-drying and impregnating shops, and other installations.

An enterprise designated as a "sudostroitel'naya verf'" has only a hull-processing works, assembly and welding shop (shop for sectional assembly), shipbuilding slips, and ship-rigging and finishing shops. A machinery construction division is lacking in a "sudostroitel'naya verf'" or is poorly developed.

An enterprise designated as a "sudosborochnaya verf'" is one with still more limited facilities. It is equipped only to assembly vessels from prepared sections, assemblies, and parts which are delivered from the outside. A "sudosborochnaya verf'" also carries out all ship-rigging work as well as dockside and running trials on ships which are then turned over to the client in the same manner as by a "sudostroitel'naya verf'" or "sudostroitel'nyy zavod."

The type of production carried out by a zavod or verf' determines its profile. A zavod or verf' may do shipbuilding, ship repair, or mixed production. In practice, both kinds of work are done in a zavod or verf'. Nevertheless, at present, there is a clearly defined tendency to free a "sudostroitel'naya verf'" from ship repairing, since repair work requires that a completely equipped machine-building shop be available or at least independent shops specialized in carrying out ship-repair work. Ship repair in enterprises which do not have separate ship-repair shops infringes on regular production of that enterprise, particularly where large series production is carried on, using constant flow methods.

The type of ship produced divides sudostroitel'nye zavody (or verfi) into enterprises for maritime, river, and lake shipbuilding. Light shipbuilding (cutters, launches, sporting and pleasure yachts, sloops, yawls, etc.), which is carried out by ship-repair enterprises, serves to classify these enterprises.

STAT

The material used in the hull of vessels produced defines a shipbuilding enterprise as performing steel, wood, or reinforced-concrete construction.

The intended use of vessels produced by an enterprise is another basis for classification. Enterprises are divided therefore into those producing merchant vessels, those producing naval vessels, and those producing specialized (tekhnicheskiy) vessels.

Shipbuilding enterprises may also be divided by the type of production they perform: individual or small series (two or three of a type or design produced), series, or large series.

The concept of series in shipbuilding is not precisely defined as of the present; the same number in a series of different types of ships does not describe a single type of shipbuilding production, and there is no sharp distinction between series and large-series production (the production of small cutters, sloops, and other such craft not being considered here).

The table below gives the six basic criteria for classification and the classification of shipbuilding enterprises.

Criteria for Classification	Classification of Enterprises		
Production description and degree of participation of the enterprise in the building of a ship	Zavod	Verf'	Sudosborochnaya verf'
Type of activity	Shipbuilding	Shipbuilding and ship repair	Ship repair
Types of ships	Maritime shipbuilding	River and lake shipbuilding	Small craft building
Hull material	Steel	Wood	Reinforced concrete
Intended use of ships	Merchant	Naval	Specialized
Type of production	Individual production	Series production	Large-series production using constant-flow methods

RBT-300 TUGS JOIN FISHING FLEET

Rybnoye Khozyaystvo
Moscow, No 6, Jun 54

The RBT-300 diesel icebreaker-tug (Figure 1, appended) has operated with a great deal of success in the roadsteads and ports of Glavsevmorput' (Main Administration of the Northern Sea Route). This type of vessel (300 horsepower) has been in series production since 1950.

STAT

The design of these ships employs the characteristics of efficiently operating tugs, placed in a hull of light displacement.

The results obtained are fully satisfactory: the ship moved through continuous ice 23 centimeters thick at a speed of 1 knot, and with a running start it was able to force ice up to 50 centimeters in thickness.

The characteristics shown by the RBT tug indicated that it would be very well suited to operations in fishing ports in the early and late periods of navigation, when ice forms at fishing bases. Accordingly, the Administration of the Fleet, Ministry of Fishing Industry USSR, organized series production of the ship for operation with the fishing fleet. The production of these ships was assigned to the Azov Shipyard of Glavrybosudostroy (Main Administration of Fishing Shipbuilding), which launched the first ship of the RBT-300 class at the end of 1953.

The RBT-300 has an all-welded hull with external plating of 6-7 millimeters in thickness to equip it for icebreaking. In general, the ship conforms to the roadstead tug type, with single deck and twin screw, and steered by water-jet nozzle. The ship is powered by two 3D6 engines of 150 horsepower each, which are controlled from the wheelhouse.

The cooling system of the engines in this ship differs from the ordinary 3D6 cooling system where the fresh cooling water (which circulates in the engine) is cooled by sea water in a condenser. In the RBT-300 type, the fresh water is circulated through an auxiliary system in the stern which is awash in sea water. This eliminates the possibility of an interruption in the sea-water intake as a result of clogging of the Kingston valve with young ice or slush.

The ship's towing equipment consists of a towing hook fastened directly to the main deck and two hand winches with 1.5 tons of pull each, which are designed for use in tightening lines when towing alongside or pushing. The bow winch can also be used as a windlass.

The ship is equipped according to the norms of the Registry, including a radio of the Urozhay type for ship-to-shore communication.

For the workers of the Azov Shipyard, who are accustomed to producing only wooden vessels, the construction of the first RBT-300 type was not without some problems.

Tests run on the first ship in January 1954 showed it able to force ice of 40-centimeter thickness. This year, these ships will begin service with fishing organizations.

WHEELHOUSE ENGINE CONTROLS INTRODUCED

Rybnoye Khozyaystvo
Moscow, No 6, Jun 54

Control of main engines from the wheelhouse is becoming more widely adopted on ships of the fishing fleet, particularly on smaller vessels. Such control not only provides faster and more precise maneuverability of the ship during mooring or fishing operations, but in many cases also does away with the necessity of maintaining an engine-room watch.

[redacted] STAT

The majority of the engines installed in modern fishing boats are equipped with combination (kombinirovannoy) lubrication systems and closed cooling systems. In addition, they are fitted with many instruments, with corresponding indicators on the bridge, which assure control of the engine and its normal running without personnel being in the engine room itself.

Central engine control has been installed in the medium Black Sea seiner SChS (metal and wood), small fishing boat RB-80, fish conservation cutters KM-20, and others.

[Comment: The RB-80 is classified as a large fishing boat. The reference to it here as a small fishing boat (MRB) is apparently in error.]

In the majority of cases where ships have been converted to central control, a mechanical system has been employed, using a rod and lever connection to the engine reversing mechanism and a flexible cable connection to the engine fuel pump.

Figure 2 (appended) shows the central control system for operation of a 3D6 engine on SChS seiners (metal). The control post (1), set up in the wheelhouse, is equipped with instruments showing the revolutions per minute of the engine, the temperature of the cooling water and lubricating oil, and the oil pressure. A starting button is also installed there. Reversing and disengaging the propeller shaft ("stop" position) are accomplished with a lever (2) which is connected by a connecting rod to the lever of the reversing clutch (3).

The number of engine revolutions is changed by the use of the flexible cable (4) which runs from the control station to the engine fuel pump.

Figure 3 (appended) shows the system of control for the 80-horsepower engine installed in small [sic] fishing boats RB-80. Reversing is accomplished by lever (1) which is connected to the engine's reversing clutch lever (2). Engine speed is controlled by a cable (3) running to the fuel pump.

The lever for the trawl winch (4) is also brought up on deck.

In cases where the wheelhouse is located far from the engine room, and particularly in cases where the ship has a 3D6 engine, the control system is of a combined cable-hydraulic connection to the reversing mechanism. Considerably less force is needed to engage and disengage the reversing clutch. Engine speed, as with the mechanical reversing control, is controlled by a separate cable to the fuel pump. A system of this type is installed on the KM-20 cutter (Figure 4, appended). In this case the control station (1) is situated in the wheelhouse and is connected to the main engine (3D6) by two cable lines, one of which (2) runs to the lever on the fuel pump and the other (3) runs to the reversing servomotor. The servomotor (4) will move the engine reversing clutch to either forward or backward running with the aid of oil taken under pressure from the lubrication system of the engine itself.

NEW GAS GENERATOR INSTALLATION DEVELOPED

Morskoy i Rechnoy Flot
Moscow, No 9, Sep 54

The workers of the Administration of Small Rivers, Leningradskaya Oblast, in connection with the scientific workers of TsNIISTEF (Tsentral'nyy nauchno-issledovatel'skiy institut stroitel'stva i technicheskoy ekspluatatsii morskogo i rechnogo flota, Central Scientific-Research Institute of Construction and

STAT

The majority of the engines installed in modern fishing boats are equipped with combination (kombinirovannoy) lubrication systems and closed cooling systems. In addition, they are fitted with many instruments, with corresponding indicators on the bridge, which assure control of the engine and its normal running without personnel being in the engine room itself.

Central engine control has been installed in the medium Black Sea seiner SChS (metal and wood), small fishing boat RB-80, fish conservation cutters KM-20, and others.

[Comment: The RB-80 is classified as a large fishing boat. The reference to it here as a small fishing boat (MRB) is apparently in error.]

In the majority of cases where ships have been converted to central control, a mechanical system has been employed, using a rod and lever connection to the engine reversing mechanism and a flexible cable connection to the engine fuel pump.

Figure 2 (appended) shows the central control system for operation of a 3D6 engine on SChS seiners (metal). The control post (1), set up in the wheelhouse, is equipped with instruments showing the revolutions per minute of the engine, the temperature of the cooling water and lubricating oil, and the oil pressure. A starting button is also installed there. Reversing and disengaging the propeller shaft ("stop" position) are accomplished with a lever (2) which is connected by a connecting rod to the lever of the reversing clutch (3).

The number of engine revolutions is changed by the use of the flexible cable (4) which runs from the control station to the engine fuel pump.

Figure 3 (appended) shows the system of control for the 80-horsepower engine installed in small [sic] fishing boats RB-80. Reversing is accomplished by lever (1) which is connected to the engine's reversing clutch lever (2). Engine speed is controlled by a cable (3) running to the fuel pump.

The lever for the trawl winch (4) is also brought up on deck.

In cases where the wheelhouse is located far from the engine room, and particularly in cases where the ship has a 3D6 engine, the control system is of a combined cable-hydraulic connection to the reversing mechanism. Considerably less force is needed to engage and disengage the reversing clutch. Engine speed, as with the mechanical reversing control, is controlled by a separate cable to the fuel pump. A system of this type is installed on the KM-20 cutter (Figure 4, appended). In this case the control station (1) is situated in the wheelhouse and is connected to the main engine (3D6) by two cable lines, one of which (2) runs to the lever on the fuel pump and the other (3) runs to the reversing servomotor. The servomotor (4) will move the engine reversing clutch to either forward or backward running with the aid of oil taken under pressure from the lubrication system of the engine itself.

NEW GAS GENERATOR INSTALLATION DEVELOPED

Morskoy i Rechnoy Flot
Moscow, No 9, Sep 54

The workers of the Administration of Small Rivers, Leningradskaya Oblast, in connection with the scientific workers of TsNIISTEF (Tsentral'nyy nauchno-issledovatel'skiy institut stroitel'stva i technicheskoy ekspluatatsii morskogo i rechnogo flota, Central Scientific-Research Institute of Construction and [redacted] STAT

Technical Operation of the Maritime and River Fleets), developed and installed on the gazokhod [a vessel carrying its own gas generator for gas supply to the engine] Luga a gas propulsion installation suitable for operation on small rivers.

The installation is made up of a KDM-46 engine and a gas generator assembly (gas generator, scrubber, and fine filter), developed by B. I. Bogatyrev of the Administration of Small Rivers, Leningradskaya Oblast.

To obtain maximum power with minimum design changes in the engine, the conversion to generated gas was accomplished using the gas-liquid cycle of of the TsNIISTEF method. In this way the compression ratio was preserved (15.5:1). At the same time, the fuel apparatus (pumps and jets) was kept without design changes for the feeding of liquid starting fuel, and the engine-speed-regulating connection to the fuel pump and the hand regulator for liquid fuel feed were left intact. All questions relative to the conversion of the engine and the determination of its optimum parameters when working on the gas-liquid cycle were answered by researchers of the TsNIISTEF under laboratory conditions. The design of the gas generator, scrubber, and filter is not different in essence from those already in existence.

To determine the technical-operation characteristics of the gas power installation and to compare the tractive force of the ship when operating on gas and when operating on liquid fuel, dockside and running trials were carried out on a straight stretch of the Luga River in the Putyatino area where the water has a depth of 5-6 meters.

To determine the power of the engine when operating on gas and when operating on liquid fuel, tests were made under three different conditions: (1) with the engine operating at maximum safe capacity on liquid feul, with normal plant regulation of fuel feed; (2) with the engine operating at a power corresponding to the minimum expenditure of liquid fuel while operating on the gas-liquid cycle; (3) with the engine running on liquid fuel at a power equal to the power produced on the gas-liquid cycle (condition 2).

The power of the engine on liquid fuel was determined by comparison of parameters obtained in the TsNIISTEF laboratory.

The table (see below) gives the data obtained from these tests.

Under equal conditions, the saving of liquid fuel when the engine was operating on gas was 12 kilograms per hour. The operation of the engine on gas steady and reliable. At rated power, the surplus air coefficient was found to be permissible for the given engine type: 1.5-1.6.

Under the indicated conditions, the exhaust gases from the engine had a temperature of 410 degrees centigrade, with an over-all installation efficiency (with fuel losses in the gas generator computed) amounting to 25-26 percent. The engine started on solid fuel and converted to gas rapidly and smoothly.

With preheating of the air in the gas generator and drying of the fuel by heat, the caloric value of the gas, depending on the production of the generator, was 1,079-1,164 large calories per cubic meter, in spite of an increase in the moisture content (34 percent) of the wood.

The temperature of the gas coming from the generator did not exceed 320 degrees and varied with the production of the generator and the moisture content of the fuel. At maximum output of 68 horsepower, the vacuum in the generator amounted to 220 millimeters of water column. During the gasifying of wood with lower moisture content (25 percent), the resistance was lowered to 150 millimeters of water column.

STAT

The disadvantage of the gas generator is the high temperatures of its outer walls, particularly on the lower part of the ash pit near the firebox.

During operation of the engine on liquid fuel (79 horsepower) and on gas (63.5 horsepower), the tractive force was 925 kilograms and 750 kilograms, respectively. When towing a light load at a speed of 10.6 kilometers per hour, the traction on the hook with the engine operating on gas was 450 kilograms, and when operating the engine on liquid with a vessel speed of 11.4 kilometers per hour the traction was 560 kilograms. With the engine operating on gas, the maximum speed was 16.5 kilometers per hour, and with the engine operating on liquid fuel, the maximum speed was 17.4 kilometers per hour.

As a result of these tests, the entire installation can be recommended for outfitting on small-river ships with room for carrying inexpensive wood fuel. It may also be concluded that the operation of the gas power installation can be improved by lowering the temperature of the outer walls of the generator, installing a valve in the upper part of the generator bunker to let off gases when the ship is not under way, and fitting a filter before the scrubber to remove impurities from the water.

[Appended Figures Follow:]

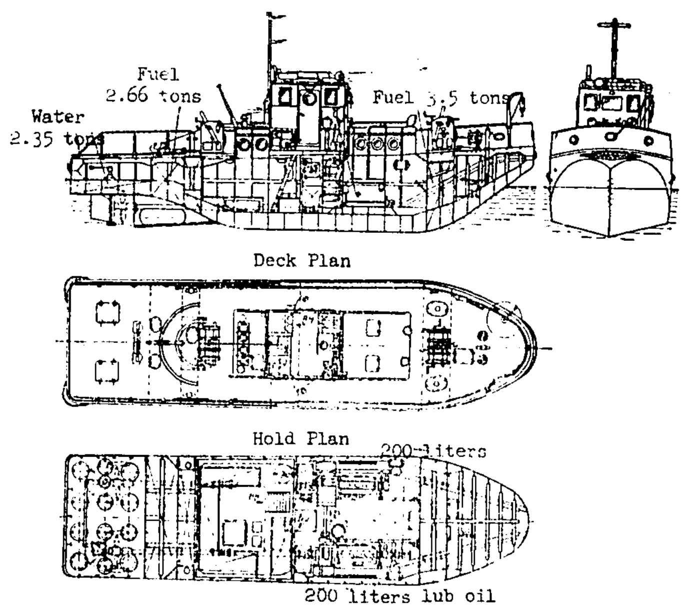

Figure 1. General Layout of the RBT-300

Sanitized Copy Approved for Release 2011/07/14 : CIA-RDP80-00809A000700230071-6

STAT

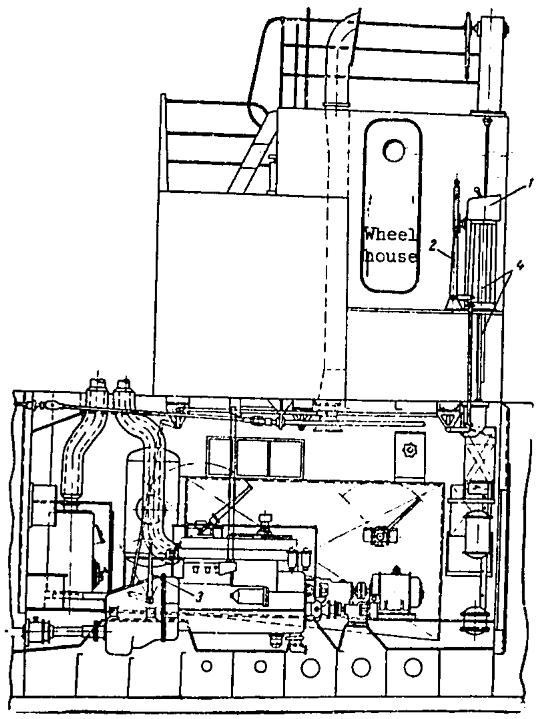

Figure 2. Central Control of the 3D6 Engine From the Wheel house

Sanitized Copy Approved for Release 2011/07/14 : CIA-RDP80-00809A000700230071-6

STAT

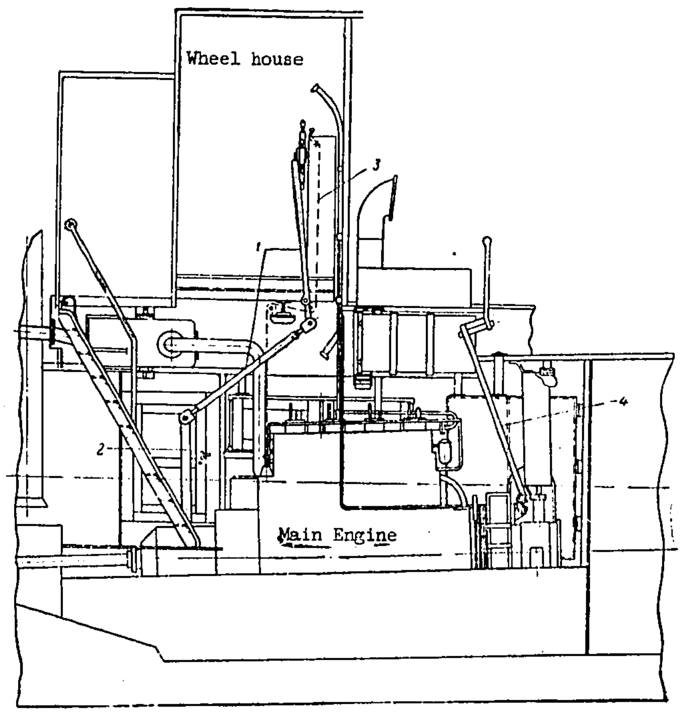

Figure 3. Control of the Main Engine on the RB-80

STAT

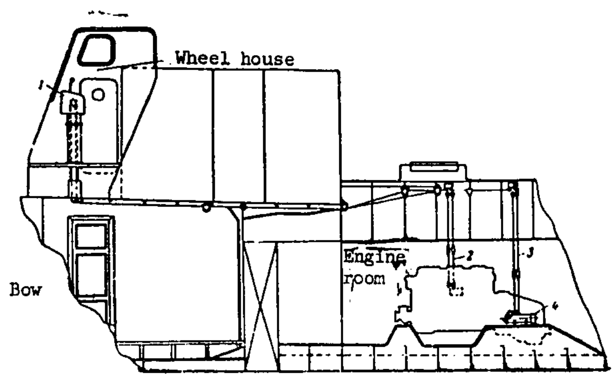

Figure 4. Combined Cable-Hydraulic Engine-Control System

STAT

Table Showing Results of Tests

Characteristic	Dockside		Running Empty		With Load	
	Gas	Liquid	Gas	Liquid	Gas	Liquid
Speed of the ship, calm water (km/hr)	--	--	16.4	16.4	10.6	10.6
Traction on the hook (kg)	750	750	--	--	450	450
Engine Speed (rpm)	850	850	970	970	900	900
Engine power (brake hp)	63.5	63.5	68.5	68.5	65	65
Consumption of liquid fuel (kg/hr)	2.15	13.0	2.4	14.4	2.25	13.4
Specific expenditure of liquid fuel (kg/brake hp)	0.034	0.205	0.035	0.210	0.0346	0.206
Relative expenditure of fuel (%)	15	100	16	100	15.7	100
Consumption of wood when moisture content is 32 percent (kg/hr)	45	--	48	--	46	--
Specific consumption of wood (kg/hp-hr)	0.70	--	0.70	--	0.72	--
Temperature of exhaust gases (deg C)	360	375	460	470	410	440
Coefficient of surplus air	1.5	1.8	1.43	1.6	1.5	1.7
Engine efficiency (%)	25.3	31	26	30	25.2	30.6

- E N D -

Sanitized Copy Approved for Release 2011/07/14 : CIA-RDP80-00809A000700230071-6